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TECHNOLOGY DEPARTMENT

# SCIENCE NEWS LETTER

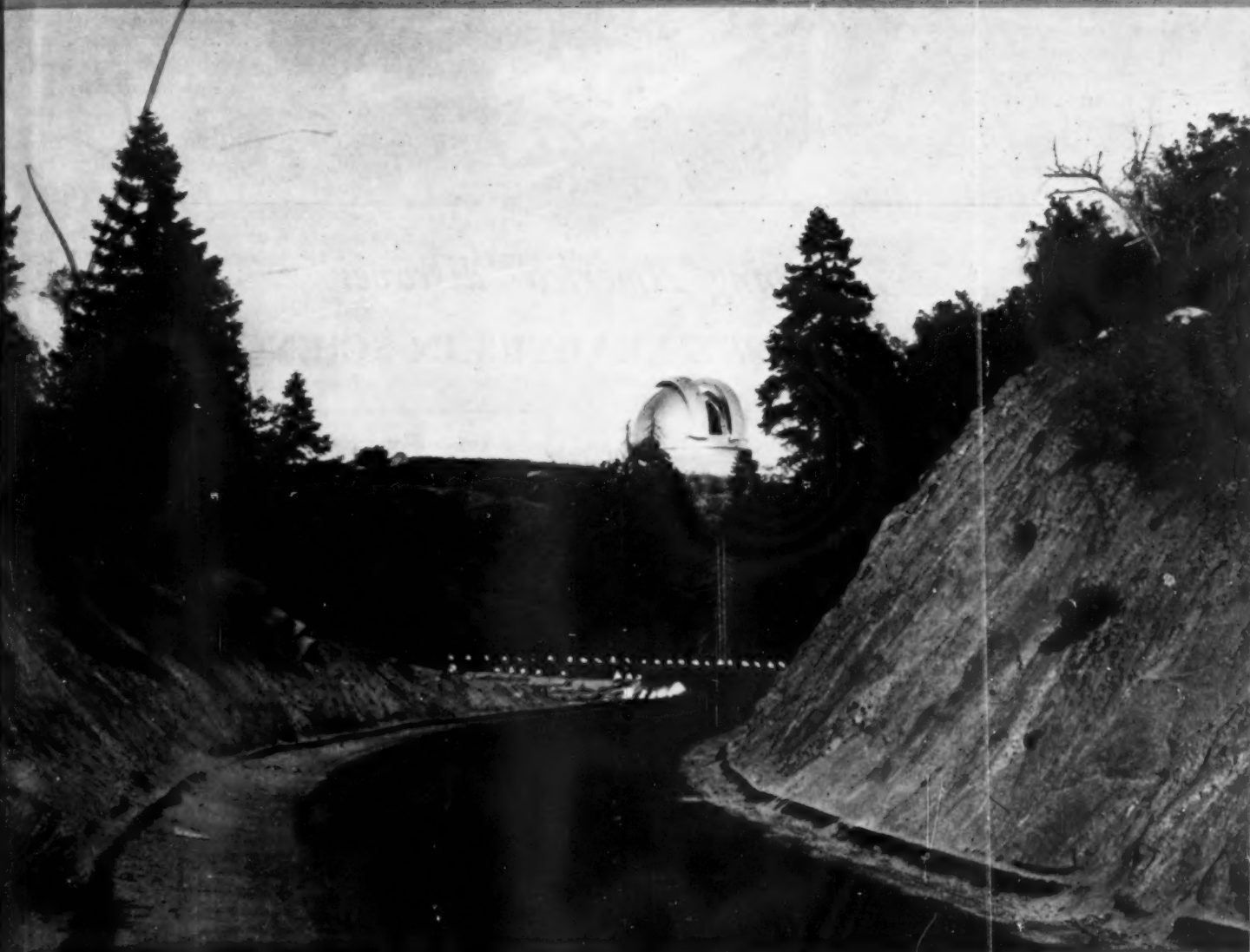
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DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 19, 1947



Road to Universe

See Page 243

A SCIENCE SERVICE PUBLICATION



*Helping America "discover"*

## TOMORROW'S LEADERS IN SCIENCE

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## NUTRITION

# Carrots Give Longer Life

**Vitamin A in large doses increased life span of rats by over 10% and may possibly do the same for humans. Extra decade comes in prime of life.**

► GET ON the carrot wagon if you want to add an extra 10 years to your life at its prime.

This advice seems justified on the basis of latest nutrition studies by Dr. Henry C. Sherman of Columbia University. Rats given four times the normal amount of vitamin A in their diet lived more than 10% longer than their life expectancy. And carrots are a very rich food source of vitamin A for humans.

The increased length of life comes at the prime of life in the rats and would in humans, too, Dr. Sherman thinks. The rats with the extra vitamin A grow more rapidly and more uniformly and have more vigorous offspring.

Vitality is higher and death rates lower at all ages. Full adult capacity, or the prime of life, is reached earlier and kept longer. Life expectation is increased not only for the young but also for grown-ups.

"The previous general progress of public health had increased the life expectation of the infant but not of the grown person," Dr. Sherman points out. "Now the nutritional improvement of the norm raises the life expectation of the adult as well.

"The extra years thus offered are not to be pictured as added to old age. Rather it appears that something like an extra decade can be inserted at the prime or apex of the life lived in accordance with today's newer knowledge of nutrition. Life becomes longer because it is lived on a higher health level throughout. The apex of attainment is higher, the period of prime is longer and, in human terms, there is a smaller percentage of years of dependence."

The basic diet to which Dr. Sherman added extra vitamin A and got longer-lived rats had the same relation between amounts of vitamin A and calories as that recommended as a good diet for humans in 1941. So if you are going to add a decade to your prime, you will eat four times the recommended amounts of carrots and other yellow vegetables

and fruits and green, leafy vegetables and liver.

Dr. Sherman, whose studies are supported by grants from the Nutrition Foundation, the Markle Foundation and Swift and Company, is now trying to learn what further benefits can be achieved by increased amounts of calcium in the diet and by improving the relation of meat and other protein foods to phosphorus and the B vitamin, riboflavin.

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## ASTRONOMY

## World's Largest Telescope To Bring Universe Closer

**See Front Cover**

► THE 200-INCH telescope on Mount Palomar in California, the largest telescope in the world, will begin sweeping the skies before the end of 1947.

The grinding of the lens, delayed more than four years by the war, is now essentially completed. The supporting structure is ready. This summer the telescope will be assembled and the whole equipment put into operation by the end of the year, reports Raymond B. Fosdick, president of The Rockefeller Foundation.

Funds for the erection of the giant

telescope have been supplied by three Rockefeller boards. A total of \$6,250,000 has been appropriated to the California Institute of Technology for this unique instrument of scientific research.

First planned about three decades ago, a number of years elapsed before successful solutions were found for the problems of casting so large a block of suitable glass, of grinding and polishing it to a precise curvature within a few millionths of an inch, and of supporting the huge mass of 530 tons so that the telescope could be moved almost without friction to follow the pinpoint of a star across the skies.

"The new telescope will project man's sight into the universe two times farther than it has ever gone before—to a distance more than a thousand million light-years away," stated Mr. Fosdick in explaining why this huge expenditure of money and effort is justified. "It will open up an unexplored sphere eight times the volume of that which has hitherto been sounded.

"What lies beyond the limits of our present knowledge?" he questioned. "Do the stellar systems extend on indefinitely, or is a boundary finally reached beyond which there are fewer and fewer nebulae? What is the true interpretation of the immense velocity with which all the stellar systems appear to be receding?

"Since stars and nebulae are vast aggregations of atoms or atomic fragments, reacting on each other under conditions of pressure and temperature beyond anything that can be duplicated in man's laboratories, what secrets can we learn that will add to our knowledge of fundamental physics?"

*Science News Letter, April 19, 1947*



**NEWEST JET**—The Army Air Forces' XB-46 recently completed its first test flight. Powered by four jet engines, it is 106 feet long and 113 feet across the wing.



## MEDICINE

# Dye for Radiation Sickness

A blue dye may save lives in case of another atomic bombing because it helps blood clotting in the illness following exposure.

➤ A BLUE DYE may save many thousands of lives in the event of any future atom bombing. It is called toluidine blue. Its potential value was discovered by Drs. J. Garrott Allen and L. O. Jacobson, of the University of Chicago, in studies made under contract with the Manhattan Project.

The dye might save those survivors of an atomic bomb attack who were having the bleeding stage of radiation sickness. A considerable number of Hiroshima and Nagasaki survivors succumbed a few weeks after the bombings from the infection promoted by this internal bleeding. Even without the blue dye they might have been saved, American doctors think, if they had gotten blood transfusions and penicillin.

Patients with acute leukemia and certain other blood disorders may also get significant temporary benefit from the dye so far as the bleeding in such illnesses is concerned, the Chicago doctors report in *Science* (April 11).

## PHYSICS

# Long-Distance Dialing

➤ STRIKES of long distance operators won't be effective sometime in the future because of two developments that are still experimental:

1. Dialing of long distance calls directly from your telephone.

2. A machine that automatically times and prices the call you are making and makes out a bill for it.

In one part of Philadelphia, the first long distance dialing is being used, but so far it is the operators who do the actual dialing.

The gadget that sees to it—mechanically—that you pay for the call is in experimental use in a Los Angeles suburb. It is called "automatic ticketing." When the Los Angeles subscriber dials a toll call to a nearby community, the equipment automatically prepares a printed ticket with all the information needed for properly charging the call.

These developments were made during the war and first put into operation

The cause of the bleeding that comes in persons exposed to near fatal doses of ionizing radiations such as those from the atom bomb is an excessive amount of heparin in the blood, the Chicago doctors find. Heparin is an anti-blood clotting substance normally present in the liver. It is used medically to counteract a tendency to dangerous blood clots. Too much of it makes the blood clot very slowly or not at all. Fatal bleeding might result.

A dog suffering from radiation sickness like that seen in the Japanese after Hiroshima and Nagasaki had blood that took more than 48 hours to form a clot when a bit of it was tested in a glass tube. The clotting time returned to normal within 20 minutes after the blue dye was injected into its veins.

Neither vitamin K, the anti-bleeding vitamin, vitamin C, calcium salts nor blood transfusions prevented hemorrhage or stopped it in the irradiated dog. But the dye controlled the bleeding.

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in 1943. The Bell System, which owns four-fifths of America's telephones, plans to expand these installations to other communities to provide an automatic long distance network, but an estimated 40% of the Bell System's subscribers still requires operators for local calls.

A combination of the Philadelphia long distance dialing system and the Los Angeles billing device may lead to future long distance calls made as easily as a call is dialed on a city phone today.

Another telephony development which may speed some types of future calls was first demonstrated in 1945. It is a radio-telephone circuit permitting 24 two-way calls to be transmitted on a single radio-frequency carrier wave.

Developed by the Federal Telephone and Radio Laboratories, the system uses the pulsetime modulation principle. A single transmitter and receiver and one radio-frequency carrier wave were used in making 24 calls at the same time.

Basically, the system uses an electronic selection system which allots certain fractions of each second for each of the 24 calls.

*Science News Letter, April 19, 1947*

## BACTERIOLOGY

# Britons Isolate Antibiotic From Penicillin Relative

➤ TWO BRITONS, John H. Birkinshaw of Pinner and Stephen E. Michael of Croyden, have isolated a new antibiotic drug from *Penicillium patulum* and *P. expansum*, two molds related to the species from which penicillin is obtained. U. S. patent 2,417,584 has been issued to them on their product.

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## PSYCHOLOGY

# Murderers by Hypnotism

People can be hypnotized against their wills, believes psychologist. Even murder is possible from a peaceful citizen in a trance.

► SOME PEOPLE when hypnotized might be made to commit murder. This is the daring suggestion of a psychologist who believes some sufficiently suggestible people can be hypnotized against their will.

An Army private in a trance tried to strangle a lieutenant colonel in one of the experiments conducted by Dr. John G. Watkins of Welch Convalescent Hospital at Daytona Beach, Fla.

Reporting his findings in the *Journal of Abnormal and Social Psychology* (April), Dr. Watkins explained that the private was a "conscientious young man" with a good military record.

"In a minute you will slowly open your eyes," the private was told after he was hypnotized.

"In front of you, you will see a dirty Jap soldier. He has a bayonet, and is going to kill you unless you kill him first. You will have to strangle him with your bare hands."

The "dirty Jap soldier" in front of the subject was a lieutenant colonel, head psychiatrist and director of the neuropsychiatric division of the hospital.

After the private opened his eyes, he began to creep forward.

"Suddenly in a flying tackle he dove at the lieutenant colonel, knocking him against the wall, and with both of his hands began strangling the man," reported Dr. Watkins.

Guards pulled the private away, and the officer declared that the hypnotized subject's grip had been "strong and dangerous."

Pointing out that the private did not violate his own conscience, because he thought he was attacking an enemy, Dr. Watkins said the private "was acting under an induced hallucination."

If guards had not intervened and if a court martial had been convinced that people cannot be made to commit crimes under a hypnotic trance, the soldier might have been convicted of murder, declared the psychologist.

An Army lieutenant, given the same test in a trance, pulled a knife he was not known to have and almost stabbed an officer friend. The friend, who played the role of the Jap soldier in the experi-

ment, was saved by witnesses who held back the hypnotized officer.

In other trance tests, Dr. Watkins forced hypnotized soldiers to divulge military information.

A corporal, described as "highly hypnotizable," was offered a \$10 bill if he could keep from entering a trance. He fell in a deep trance staring at the bill.

"The controls," Dr. Watkins explained, "were certainly not as rigid as one would desire to establish firmly that criminal compulsions are possible, yet the combined weight of the evidence from these studies definitely favors that contention."

He added that the subjects chosen for the experiments were highly hypnotizable, but warned:

"There apparently would be many thousands of individuals like them in the total population."

*Science News Letter, April 19, 1947*

## TEXTILES

## Color of Chicken Feathers Determines Shade of Wigs

► BEAUTIFUL blonde, brunette and red-head wigs for show-window manikins have been made experimentally from chicken feathers without dyeing the fibers. The natural color of the feathers determines the exact shade of the finished wig.

Not the fluffy feather tips, but keratin in the quills, is used in making the silky fiber. The feathery barbs are first stripped off, then the quills are treated with an alkaline salt of an alkybenzene sulfonate. The solution is then passed through a fine-holed nozzle into a coagulating bath, where the individual fibers harden.

The process for making the fiber from chicken feather protein was developed at the U. S. Bureau of Agricultural and Industrial Chemistry's Western Regional Laboratory at Albany, Calif. This fundamental research is being conducted in an attempt to find a profitable use for some of the keratin material found in approximately 175,000,000 pounds of chicken feathers that are usually wasted each year.

Chief obstacle in the way of using



"LITTLE RHODA"—The silky fibers composing the wig of this model, named by the U. S. Department of Agriculture, were made from the feathers of a Rhode Island Red chicken and have the natural color of the feathers.

these fibers for textiles is that they absorb water and are much weaker when wet. But continued improvement in the wet strength of fibers from feather keratin is predicted through use of fundamental studies of the molecular structure, and chemical and physical properties of keratin. When a fiber having sufficient wet strength is developed, it is expected to have many uses.

*Science News Letter, April 19, 1947*

## FOOD CHEMISTRY

## Vinegar-Pickling Method Of Preserving Is Refined

► A REFINEMENT of the time-honored method of preserving meat by pickling it in vinegar is the basis of patent 2,417,806, issued to Hans F. Bauer and Elmer F. Glabe of Chicago, assignors to Stein, Hall and Company, Inc. They use an acetic acid salt.

Another refinement of the vinegar-pickling method is the subject of patent 2,417,889, granted to M. J. Stammelman of New York. He makes a food container with porous walls, which he impregnates with vinegar. The acetic acid vapor, slowly given off, prevents the development of spoilage molds and bacteria.

*Science News Letter, April 19, 1947*



## NAVIGATION

# U.S. Subs Out of Date

German snorkel and speed have made our U-boats obsolete except in their strength of build and the superior craftsmanship of the U. S. Navy.

By VICE ADMIRAL CHARLES A. LOCKWOOD

Inspector-General of the Navy

*In a radio talk on "Adventures in Science" given over the Columbia Broadcasting System.*

► THE NAVY has been celebrating an anniversary. Just 47 years ago the first submarine was accepted by the Navy. It was the *USS Holland*, named after the American inventor who built this submersible torpedo boat, as it was then called.

It was the great-grand-daddy of the modern fleet type submarine which is 310 feet long, displaces 1,700 tons, and is propelled by four powerful diesels totaling 6,400 horsepower.

This fleet-type submarine was the type of craft that destroyed a large number of Japanese vessels, both merchant and navy.

Our fleet-type submarines numbered only 39 at the beginning of the war. Records prove our submarines were the longest-range and most consistently effective weapon against the economy of maritime Japan.

## Bikini Test Results

The United States submarines which were submitted to the power of the two atomic bombs at Bikini last summer came out remarkably well. At the risk of over-simplification, it can be said that of all vessels tested during Operation CROSSROADS the submarines were consistently least affected and displayed the greatest potential resistance to the ravages of a "fission" bomb. This is not to imply in any way that had either of the bombs directly struck any of the target submarines, they would not have been completely destroyed.

A submarine has a relatively small above-water structure and a tough, tubular hull designed to withstand the shock of depth-charging. However, the unfortunate part about this splendid vessel is that it is becoming obsolete!

Two things have made the American submarine of World War II behind the times. By late 1944 the superiority of our

own anti-submarine measures against the German U-boats in the battle of the Atlantic was sufficient also to render United States submarines relatively ineffective against such counter measures. Fortunately, the Japanese were less skilled in combating American submarines and the advance of Allied surface and air forces was such that U. S. under-sea craft had just about worked themselves out of business. The Navy did not wish to develop and build an advanced type of American submarine when it had no prospect of being employed at the time.

## German Developments

The Germans were faced with extinction unless something could be done to turn the tide of battle in the Atlantic. They summoned their best scientists and engineers in desperation with orders to overcome the superiority which Allied anti-submarine measures had over them. When the war in Europe was over, our scientific investigating teams made astounding discoveries. They found something which, had it been put into operation, might well have prolonged the whole European phase of the war.

The Germans had been mass-producing a new type of submarine which had the snorkel, the breathing tube that could be raised and lowered like a periscope to provide air for the ship's diesel engines and the crew. In addition to the snorkel, the German subs had a radically streamlined hull to take full advantage of the increased battery capacity, both resulting in higher speed submerged.

The snorkel had already appeared on the standard German submarines. This allowed them to remain submerged the entire time they were away from their own ports. It made the already tough job of locating them submerged even more difficult, and they were never any longer caught on the surface. In the newer German types the streamlining and higher battery capacity resulting in an increased submerged speed, although of limited duration, would have definitely added to the difficulties of our searching anti-submarine craft. Submarines thus equipped

could not only catch up to fast convoys and deliver their torpedoes, but they could get farther away in shorter time following the attack, making the area to be searched much larger.

The day of the submersible or the surface craft that could dive is past. The true submarine, or the vessel that can remain submerged indefinitely, has made its appearance, although it must still get its air from the surface. Not only that, it is a vessel of greatly improved tactical characteristics in a field where such developments will contribute enormously to chances for survival of such a craft following an attack.

## Germans Too Late

The German understanding of the importance of seapower was really the thing that was too late. Actually the advanced craft could have been in operation well before the end of the war. About 80 of them were completely built in 1944; but the Germans had suddenly resorted to hydraulics in an effort to avoid the use of electric motors. Hydraulic installations are tricky and require a lot of "know how". The Germans didn't have it and saved the Allies a lot of headaches as a result. They were still trying to overcome hydraulic deficiencies when the war terminated.

These German submarines, submerged, could make about 15 knots compared to nine knots for our fleet type vessels. Allied investigators found German blueprints for a submarine which was to have even greater submerged speed.

The House of Representatives recently passed a bill allocating \$30,000,000 for the construction of two new experimental submarines. That bill is now in the Senate and, if passed, will be one of the more obvious steps the Navy is taking to maintain submarine superiority.

## Navy Making Tests

The Navy has two of the German so-called Type 21 submarines now in operation for testing and evaluating purposes. It is true our own submarines, when the war ended, had few if any of some of the more important German advancements. We had submarines that were materially much better built than the Germans. We had superiority in electronic, sonar and torpedo fire-control gear. These, however, were simply improvements in the established practices of submarine construction and operation.

But the United States has one supe-

priority. The experience gained by the American Navy in using carefully trained personnel and developing by trial and error a superior tactical use of the submarine, mutually supported by all elements of the Navy team, is ours alone. It cannot be taken from us nor can it be readily imitated.

There are countless indications of the increased importance of the submarine in the navies of tomorrow. Atomic energy is certainly the perfect answer to submarine propulsion requirements. Once worked out it becomes an unlimited power source and, more than that, it would require no oxygen supply for operation. Atomic propulsion would eliminate the link with the surface pro-

vided oxygen could be carried in sufficient quantities to support the life of the crew members.

Unfortunately, one of many innumerable obstacles to the installation of atomic propulsion in a submarine is the present limited space available in an undersea vessel. An atomic propulsion plant is going to require a lot of room.

The U. S. Navy probably will lay out several submarine types for the future so that we may do varying tasks better. In a future world of guided missiles, atomic warheads, and atomic propulsion the submarine will be a vessel with missions to perform which in many cases are now designed to be done by surface ships and aircraft alone.

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## AERONAUTICS

## Teleran for Safe Landing

► A NEW AIRPLANE navigation and bad weather landing system has come out of the laboratories and is ready for development by engineers into a form suitable for airport installation.

The system, developed by the Radio Corporation of America, is named "Teleran." The name was coined from the chief ingredients of the new device, television and radar.

RCA engineers told scientists and aviation writers that Teleran as a practical device is not here, but "just around the corner."

In the new aircraft navigation and landing aid, ground-based radar, the same or similar to that in the Ground Control Approach equipment (GCA), scans the sky for miles about an airport.

Television brings the picture on the ground radar scope to the pilot in his cockpit in the plane.

The pilot sees not only the shadow picture on the radar scope but at the same time a superimposed map of the airport area. He sees his own plane as well as others represented by spots on light. The same television can also give the pilot weather maps or written traffic instructions. The picture is simplified by a screening process and made brilliant with special phosphors.

A special transmitter and receiver unit, called a transponder, gives the pilot a separate radar picture for each altitude.

The transponder has a receiver and transmitter connected together so that the transmitter emits one or more pulses when the receiver picks up a pulse

separated at a time interval that corresponds to the plane's altitude.

An automatic device called a discriminator circuit can be made to sort out automatically the responses sent by the ground station according to the altitude.

RCA scientists have been engaged for a half-dozen years in developing Teleran. A recently-perfected part of the system is a simplified television camera that is compact. Teleran can be used in air navigation, traffic control, collision pre-

vention and instrument approach to an airport.

The same apparatus in the plane is used for all operations, and its total weight is about 100 pounds.

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## VETERINARY MEDICINE

## Eggs Found to Carry Serious Poultry Disease

► EGGS MAY BE the "Typhoid Marys" of one of the most serious of poultry diseases. Dr. W. A. Boney, Jr., of the Texas Agricultural Experiment Station, has discovered that turkey eggs can harbor the germs of the disease known as fowl typhoid. Although he has been able to isolate the organism from only one egg out of 374 examined, research men regard his findings as significant. Eggs have long been suspected as carriers of fowl typhoid, but efforts of earlier workers to locate the causal organism in them apparently were unsuccessful.

Dr. Boney states, in his report in the *American Journal of Veterinary Research*, that the organism can be isolated easily from the reproductive systems of both male and female birds. He points out that transmission by way of eggs may in some cases explain why outbreaks of fowl typhoid occur in brooder houses or on ranges where it seems impossible to account for its introduction from an outside source.

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**TELERAN**—The new RCA television-radar air navigation and traffic control is installed in the cockpit of a flight simulator. Data are shown on a screen on the instrument panel.



## AERONAUTICS

**Hovering Makes Helicopter Require More Horsepower**

► ABILITY to hover on the part of a helicopter creates a special problem in power plant design for this type of aircraft, the Society of Automotive Engineers meeting in New York was told. Smaller engines could be used if pure hovering were not required.

Horsepower required to hover at zero speed is very large compared to the minimum power required at significant forward speeds for either the helicopter or the airplane, Robert A. Wolf and Carl P. Spiesz, of Bell Aircraft Corporation, declared.

If short ground runs are available to the helicopter, it can take off at reasonably low powers with loads comparable to airplanes, they stated. It is quite conceivable that tomorrow's cargo helicopters, operating from airports where pure hovering is not required, will have smaller power plants or will carry greatly increased loads.

Power plant weight is an important consideration in the helicopter, and continuous research is needed, they said, looking toward reducing engine weight and increasing horsepower output.

Jet-propelled rotors will some day be successful, they predicted. The blade-tip jet appears to offer promise because it might produce reasonable propulsive efficiencies at the fast travelling blade tips, and would produce a light-weight, simple power plant.

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## NUCLEAR PHYSICS

**Uranium Can Give Birth To Triplets and Quadruplets**

► WHEN URANIUM, the atomic bomb element, fissions it can give birth to triplets and quadruplets as well as the conventional twins of hearts of other lighter elements.

This discovery, announced in the *Physical Review*, was made by two Chinese and two French scientists working in Paris at the nuclear chemistry laboratory of the College of France.

When a uranium atom splits into three, instead of the usual two atomic fragments, more atomic energy is actually released.

Since the ternary fission occurs only about once while 300 or more ordinary fissions are happening, this increase of energy is not very important.

Still rarer are the cases of quaternary

fission in which four fragments are produced.

The new fission processes were discovered by use of photographic plates soaked in a uranium compound and exposed to slow neutrons, the kind of particles that sets off the atomic bomb.

The scientists who did the experiments are Tsien San-Tsiang, Ho Zah-Wei, R. Chastel and L. Vigneron.

When uranium and plutonium fission they give off relatively long-range helium atoms, called alpha particles, flying through eight inches of air. This was discovered at the Los Alamos atomic bomb laboratory in 1944 and only now released from wartime secrecy. When observed by Drs. G. Farwell, E. Segre and C. Wiegand it seemingly was not too important in building the bomb and the investigation of this effect is only now being continued.

*Science News Letter, April 19, 1947*

## ORDNANCE

**Largest Water Tunnel To Test Navy Equipment**

► A WATER TUNNEL, believed to be the largest in the world, will be built at the Ordnance Research Laboratory of Pennsylvania State College under an agreement between the College and the Navy.

Designed for testing Naval underwater equipment, the giant tunnel will have a capacity of about 130,000 gallons of water. It is to be a sort of water version of the famous wind tunnels used to test model aircraft.

Expected to be completed in less than two years, the tunnel will be constructed as a closed circuit with water circulated by an adjustable pitch propeller. A motor of 1,750 base power will be used to circulate the stream at top speed. The empty tunnel shell will weigh 120 tons.

Some jobs planned for the tunnel include research on improved body shapes for submarines and torpedoes and the development of superior propellers. Elaborate equipment will be used to measure the performance of models in the water tunnel.

Water speeds ranging from 4 to 35 nautical miles per hour will be produced in the test section of the tunnel which will be four feet in diameter and 14 feet long.

The tunnel will be housed in a new building with offices, service shops and other facilities for preparing and testing models.

*Science News Letter, April 19, 1947*

## IN SCIENCE

## AERONAUTICS

**Two Inventions to Improve Safety, Travel in Planes**

► TWO INVENTIONS aimed at the improvement of air travel and its greater safety are among new U. S. patents.

One, a pickup tow by means of which a plane in the air can help another plane to get up off the water with a minimum run, is the invention of the late Richard C. du Pont of Granogue, Del. The plane to be towed sets up a loop of line, made of nylon or other stretchable material, on two uprights, either from its wing-tips or from a twin tail assembly. The towing plane swoops over it, with its pick-up hook held in proper position by an oblique rod. As soon as the hook engages the loop, the full length of towline needed is run off a braked drum, and the lift begins. Once airborne, the towed plane can cast off the towline when ready.

Rights in this invention, covered by patent 2,418,702, have been assigned to All American Aviation, Inc.

The other invention, protected by patent 2,418,798, is intended to minimize injuries to passengers in crash landings or collisions. More people are hurt in such accidents by being slammed forward against the seat in front than in any other way. Arnold Whitmer of Buffalo has designed a quickly inflatable air cushion, to be stowed in collapsed condition in the back of each seat, which can be instantly blown out to functioning position when the pilot sees trouble ahead.

*Science News Letter, April 19, 1947*

## OPTICS

**New Filter for Infra-Red Is Opaque to Visible Rays**

► TWO Massachusetts inventors, R. G. Shepherd, Jr., of Needham Heights and C. D. West of Cambridge, present a filter that is opaque to visible light but transparent to infra-red rays, for patent 2,418,605, which they assign to the Polaroid Corporation. The filtering properties are embodied in a sheet of dyed regenerated cellulose, which is protected against mechanical injury by placing it as the sandwich layer between two panes of glass.

*Science News Letter, April 19, 1947*



# THE FIELDS

## ANIMAL HUSBANDRY

### High-Bred Cows Are Not So Fertile or Long-Lived

► ARISTOCRATIC cows, bred and selected through generations for high milk and butterfat production, may be uneconomical because they do not live long enough and bear a sufficiently large number of calves. This dairyman's dilemma is pointed out by scientists at the New Jersey Agricultural Experiment Station.

Average life of high-bred cows under their observation is seven years, which means they "come in fresh" only about four times, producing only four calves. The two most frequent causes of the decline in productivity of such cows, which condemns them to the slaughterhouse, are udder troubles and partial or complete sterility.

Breeders in New Brunswick have embarked on a program of selection for longer life and higher fertility, even if a slight sacrifice in annual milk production has to be made.

*Science News Letter, April 19, 1947*

## MEDICINE

### Zirconium Used to Treat Atomic Age Plutonium

► A TREATMENT for the new atomic age disease, plutonium, has been discovered at the Argonne National Laboratory in Chicago. "Encouraging results" in the preliminary trials are reported by Dr. Jack Schubert, now at the University of Minnesota Medical School in *Science* (April 11).

The treatment consists in displacing the poisonous radio-element, plutonium, from the body by injections of a harmless metal, zirconium.

While no one has suffered from plutonium so far, scientists worry lest it become a health peril to atomic energy workers, like the radium poisoning that struck watch dial painters after the first World War. The hazards of plutonium poisoning are much greater than those of radium poisoning because of the relatively large amounts of plutonium available and the greater numbers of persons exposed to it.

Plutonium and many other long-lived

radio-elements which find their way into the body are deposited mainly in the skeleton. An appreciable amount of plutonium also gets into the liver and spleen. Zirconium acts first to displace plutonium from the liver. Later the zirconium migrates to the bones and slowly but continuously displaces the plutonium deposited there, driving it out of the body. The extent to which it does this depends on the amount of zirconium in the bones in relation to the amount of plutonium.

The encouraging results with zirconium were obtained in studies with dogs and rats. Further studies are under way to determine its effectiveness in radio-yttrium poisoning and other radio-elements.

*Science News Letter, April 19, 1947*

## POPULATION

### Latin-American Countries Crowded Without Refugees

► LATIN-AMERICAN lands do not offer the wide havens of refuge and resettlement that have been wishfully pictured for uprooted European populations, William Vogt, chief of the Pan American Union's conservation section, declared in a Cosmos Club lecture in Washington.

Instead, from thirty to forty millions of the people who already inhabit the countries south of the Rio Grande are in need of resettlement because of the exhaustion of the lands on which they are now living and the rapid increase in population.

As examples, Mr. Vogt pointed to conditions in El Salvador and Venezuela. In the small Central American republic the population is so dense that the area of actually tillable land now averages only one-half acre per person. Venezuela, on superficial examination, appears to be under-populated, because of the relatively small number of people living in its great area. However, the actual living space is crowded because geographic barriers at present impassable prevent utilization of a great deal of the country's map area.

Land use in most Latin-American countries is extremely destructive to the soil, Mr. Vogt stated. Forested slopes are cleared and planted to crops, only to have the soil gullied and washed away by the heavy rainfall. With no soil left, the people soon lack food. And in the meantime a declining death rate and a maintained birth rate increase the number of mouths to feed.

*Science News Letter, April 19, 1947*

## NUTRITION

### Special Diets According To Jobs to Be Developed

► YOUR doctor may some day in the future prescribe a diet for you according to your particular job. Workers in automobile plants might get one kind of diet, while workers in the paint industry or in dye houses would get other diets.

Whether special diets could protect workers from illness and what such diets should be are subjects of a long-range research project at Columbia University. Dr. Leonard J. Goldwater is in charge of the research under a grant of \$11,000 from the U. S. Public Health Service's National Institute of Health.

"It has long been known," Dr. Goldwater said, "that individual workers in the rubber, automobile, paint, dye and other industries show marked variations in the way they react to harmful dusts, gases and fumes. Some are relatively unaffected, while others become seriously ill. Present treatments for these occupational illnesses are largely unsatisfactory."

"There have been sporadic reports that vitamins and other nutritional factors may play a part in determining whether workers are susceptible or resistant to harmful atmospheric contaminants. We intend, therefore, to expose white rats fed on various types of diets to all the different types of toxic fumes found in industries manufacturing chemicals, dyes, solvents, explosives and other products. The variable nutritional substances to be added to the rats' diet will consist mainly of vitamins, proteins and minerals."

*Science News Letter, April 19, 1947*

## CHEMISTRY

### Electrolytic Method Gets Cobalt from Natural Ore

► A SUCCESSFUL commercial process for obtaining the metal cobalt from its natural ores was described at the Electrochemical Society meeting in Louisville, Ky., by F. K. Shelton and associates of the U. S. Bureau of Mines, Boulder City, Nev. It is an electrolytic method; the product is a high-grade cobalt.

The process comprises roasting the cobaltic ore, extracting the arsenates which occur in the ore by a caustic leach, extracting the cobalt from the residual solids in an acid bath, purifying the leach solution, preparing cobalt carbonate from the purified solution, and obtaining the cobalt from it by electrolytic action.

*Science News Letter, April 19, 1947*

DENTISTRY

# Bad Teeth By Inheritance

Part of tooth troubles is due to heredity. If parents have good teeth, children have little trouble with theirs.

By JANE STAFFORD

► IF YOU have a lot of toothaches and have to spend hours in the dental chair getting cavities drilled and filled, you probably drank the wrong kind of water as a child. But then, again, at least part of your tooth troubles is probably due to heredity.

The importance of the parental influence in the liability of teeth to decay is stressed by Dr. Henry Klein, senior dental officer, U. S. Public Health Service. According to his findings, the mother who says, "My daughter gets her poor teeth from me," is right.

A study of the teeth of 5,400 parents and children in 1,150 families furnishes considerable evidence for this view. The families were of Japanese ancestry, studied at the Colorado River Relocation Center.

## Inherited Tendency

When both parents had little or no signs of dental disease, their children also had good teeth, Dr. Klein found. When both parents had poor teeth, the children also had much dental trouble. If one parent had good teeth and the other had medium or very bad teeth, the children had more tooth decay than children both of whose parents had good teeth, but less than that seen in children with both parents having poor teeth.

The state of the mother's teeth seemed more closely related to that of the daughter's than the state of the father's teeth did. Susceptibility to tooth decay, Dr. Klein concluded from this study, seems to run in a family, very likely is inherited and may be sex-linked.

The hereditary influence on teeth is probably strengthened by another fact, Dr. Klein's studies disclosed. This is that like tends to mate with like when it comes to teeth as well as eye color and nationality. In this study Dr. Klein was assisted by Dr. Toyo Shimizu, dental officer of the Office of Indian Affairs.

Men and women with large numbers of DMF (decayed, missing and filled) teeth tend to marry men and women who

on the average have more than the usual number of DMF teeth for their age and sex, the dentists found.

The reverse is also true. Those with good teeth tend to marry those with better-than-average teeth.

The dental officers do not think this is a matter of conscious choice, however. Besides observing that their findings are consistent with the view of human biologists that like tend to marry like, the dentists point out that people who marry tend to come from about the same local geographic background. They would therefore have shared the same environmental conditions when their teeth were being formed.

Even with a hereditary start toward poor teeth, a child may escape with only a few toothaches and cavities if he got the right kind of water to drink while his teeth were being formed.

Small amounts of the chemical, fluorine, in the drinking water may help prevent tooth decay. This is a fairly well-

known story now, and several communities are adding fluorine to their water supplies to take advantage of its anti-carries action.

This measure was not expected to help anyone except children born in those communities after the water supply was fluorinated. Fluorine, it has been believed, only protects the teeth of persons drinking fluorinated water from birth and during the period while the teeth are developing in the jaw.

## Good Effects Applied

Its good effects, it has just been discovered, can be applied at considerably later ages. First and second molars and second bicuspids that are already erupted in the mouth can be protected by fluorinated drinking water if they are exposed to the fluorinated water soon after eruption.

This means that in cities where fluorination has been started, not only the new babies and toddlers, but children up to about 14 years old will have better teeth and fewer toothaches. This finding of Dr. Klein's was also made on some of the Japanese children relocated during the war. The children in this study all had previously lived in Los Angeles and were transferred to centers in California and Arizona.

## Tests with Fluorine

At the California center the drinking water contained almost no fluorine. At the Arizona center the water supply contained just about the caries-preventing amount of fluorine. Children between eight and 14 years of age at the time of relocation who went to the fluorine region had considerably fewer new caries in the teeth most susceptible to decay than the children who lived two years in the fluorine-free water region.

Drinking water may also contain substances that make teeth more vulnerable to decay as well as fluorine which protects against caries. Evidence for this was discovered by Dr. Klein in examinations of the teeth of more than 3,000 New Jersey school children. These were made with the cooperation of Dr. J. M. Wisan, New Jersey health department's dental chief, and Dr. John F. Cody of the U. S. Public Health Service.

The children lived in five communi-



**CHARACTERISTIC POSE**—This youngster is using the rail on his play pen as a teething ring.

ties of southern New Jersey. In three of these communities the water supplies contained enough fluorine to favor resistance to tooth decay. In the other two, the water was considered fluorine-free.

## Fluorine Benefits

Of the 3,000 children, 1,307 had been born outside the five communities and moved into them at various ages. Of those moving into the fluorine communities, the younger the child was at the time he arrived there and the longer he lived there, the less his teeth were attacked by decay. This showed the now generally recognized effect of fluorine in drinking water in favoring resistance to tooth decay.

By contrast, among the children moving into the fluorine-free areas, the most recent arrivals had the best teeth while those who had lived in the area the longest had the worst teeth so far as decay was concerned.

## Decay Cause Sought

Scientists are now actively searching for the substances in the water of the communities that make teeth more vulnerable to decay. Superficial examination shows that the nonfluorine waters in the communities are acid enough to need treatment with alkali and that they contain so much excess iron that it is necessary to aerate the water to remove it. An unusually high content of nitrates has also been found in these waters.

Regular use of an anti-decay chemical treatment of the teeth of all children is now recommended by the American Dental Association.

The chemical is sodium fluoride. It would be applied by the child's dentist in a 2% solution to the crowns of the teeth twice a year after a preliminary series of at least four treatments for each tooth.



**HANDED DOWN**—Babies fortunate enough to have parents with good teeth are likely to have few toothaches and spend little time in the dentist's chair.

Because sodium fluoride is a poison, the treatment should be given by a dentist who is in position to guard against use of too strong a solution or other potential dangers.

The treatment is advised as a general preventive measure, but does not have any 100% guarantee that it will prevent tooth decay in all children. It has cut down the occurrence of decay as much as 40%, dentists who have tried it have reported.

The treatment is not effective on the teeth of grown-ups, so far as present evidence goes.

The mechanism by which fluorides inhibit tooth decay is unknown. Current theories are that the fluorides provide a protective factor in tooth enamel and that the drug inhibits the growth of acid-producing bacteria believed to be a cause of dental decay.

Science News Letter, April 19, 1947

## METALLURGY

## Alloy for Aircraft Saves Weight, Gives Strength

► A NEW zinc-magnesium-copper-aluminum alloy was described to the Society of Automotive Engineers in New York by George Snyder and Frank J. Crossland, Boeing Aircraft Corp., which can be used in certain aircraft structural applications to save weight and increase strength. Its most significant advantage, they stated, is increased strength for both compression and tension. It is claimed to be about 55% stronger than the present standard aircraft material.

The metal, designated 75ST, contains approximately 5.5% zinc, 2.5% magnesium, and 1.5% copper. Its maximum physical properties are obtained by a special heat-treatment followed by artificial aging.

*Science News Letter, April 19, 1947*

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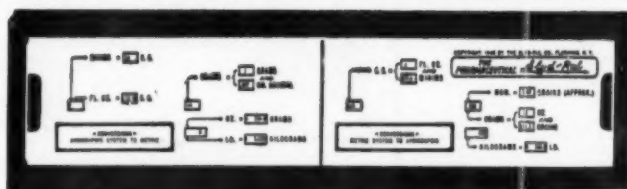
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## NUTRITION

## Army Rations Need Not Vary with Climate

► A SOLDIER wants about one-tenth of his daily food to be meat or other protein foods, whether he is sweltering on a Pacific island or enduring the Arctic cold. And he eats from one-third to two-fifths of his food as fat, given a chance to eat all he wants from a wide variety of rations. But he eats a good deal more in the Arctic than in the tropics.

These findings were made by Drs.

Robert E. Johnson, now at the U. S. Army Medical Nutrition Laboratory, Chicago, and Robert M. Kark at the Harvard Fatigue Laboratory in Boston.

In the desert with the temperature 92 degrees Fahrenheit soldiers each ate 3,100 calories daily on the average. In the Arctic at 30 degrees below zero Fahrenheit, they consumed 4,900 calories daily. But the proportion of protein and fats chosen to the total calories remained about the same.

Science News Letter, April 19, 1947

## ENGINEERING

## New Methods, Old Type Of Houses for Future

► HOUSING SHORTAGE note: modern soil engineering science is reviving two of the oldest types of homes man has built.

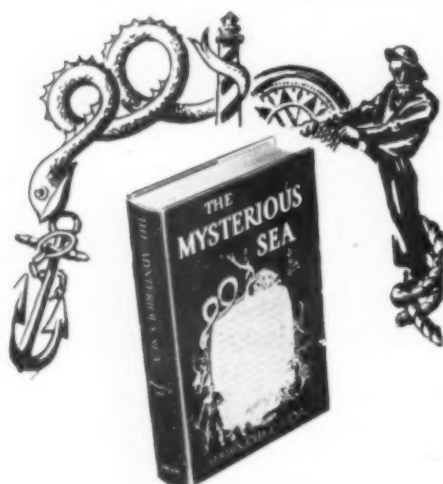
Strong, durable houses can be built of adobe or rammed earth, a wartime report by the Board of Economic Warfare declares. The report, released by the Department of Commerce, suggests some modern innovations for the building methods which date back to prehistoric times.

Rammed earth buildings, made by tamping a damp mixture of sand, silt, clay and gravel into wall forms, should include a protective finish in places with a rainfall of more than 25 inches a year or a rainy season. Cement-stabilized rammed earth is a sturdier construction material than the more ancient product.

Latest development in adobe construction, which was used by Indians of the Southwest centuries ago, is asphalt-stabilized adobe blocks.

The report on rammed earth and adobe buildings was prepared in 1943 for use of the U. S. Army in North Africa.

Science News Letter, April 19, 1947



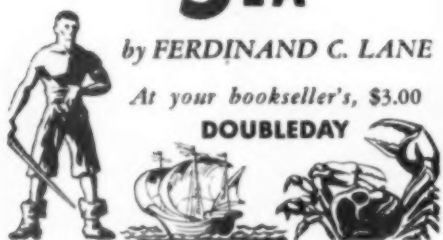
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## Do You Know?

Spring-blooming *shrubs* are best pruned after flowers have faded.

The American Meteorite Museum, Winslow, Ariz., has a *meteorite* containing gold and others showing diamonds.

A mill in Leicester, England, has a new machine that makes 32 full-fashioned *stockings* in 35 minutes.

Copper and brass *ornaments* in a house can be cleaned with hot vinegar or lemon juice and salt.

In the Western Hemisphere, Mexico and Puerto Rico stand the highest in *birth* rate; they stand high also in death rate and population increase rate.

Shady lawns that get as much as three hours of sunshine a day do not need special *grass* seed; the soil, however, may need special treatment because of the tree roots.

Australian cave *paintings*, thought to date back to Australia's stone age, were annually retouched by Australian natives before the arrival of white men with red and yellow ochre and pipeclay white.

Cows on New Zealand large dairy farms are *milked* by machines in an "assembly-line" procedure; they enter the milking shed in single file to a stall at the head of the line and, after being milked, pass out through the front of the stall.

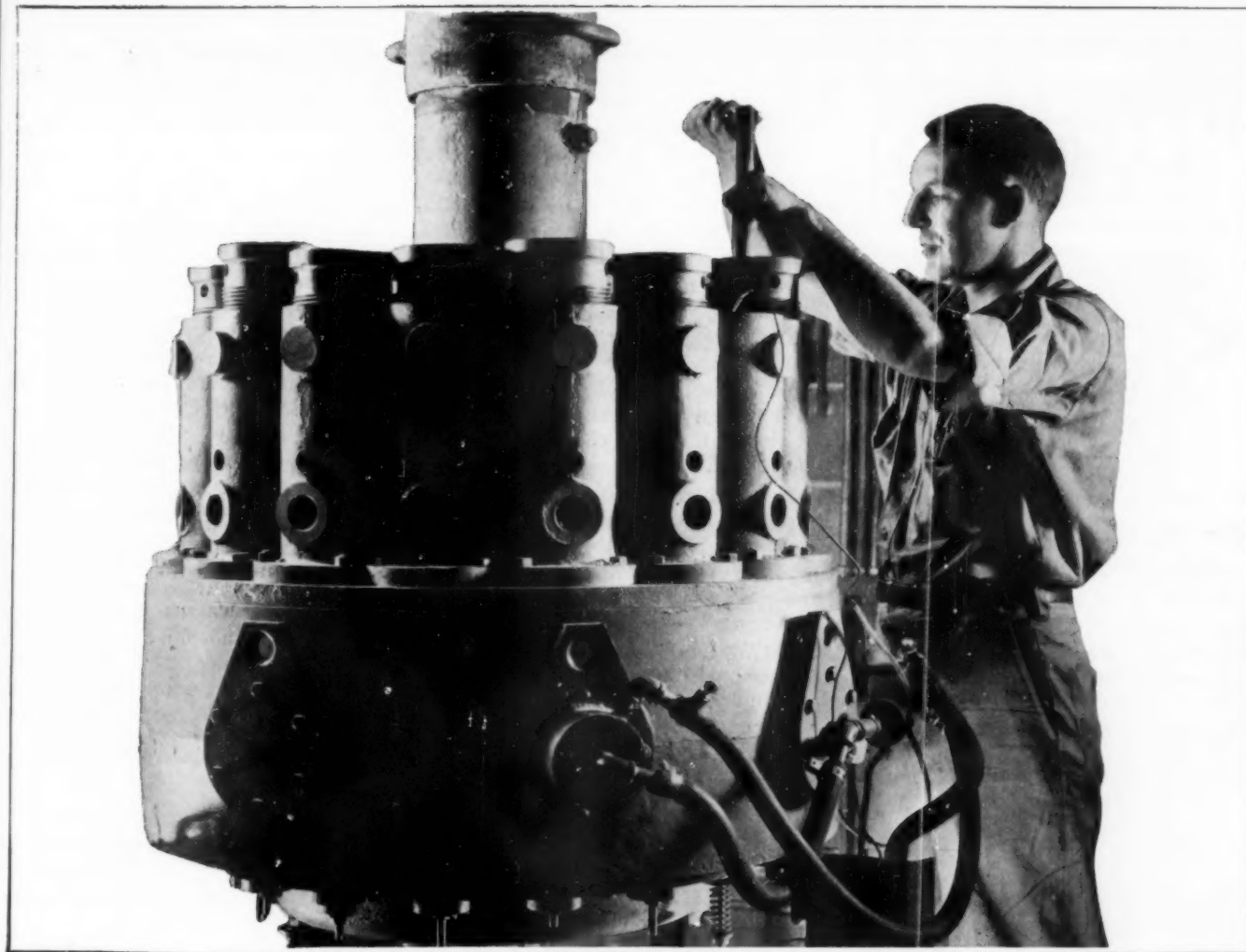
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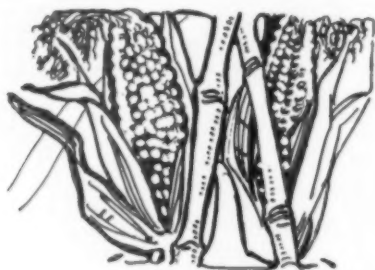
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### Prairie and Plow

► WHEN FARMERS first transplanted themselves from the Old World to the New, most of them came from countries that had once been forest-covered. Land had to be won with the ax before it could be given to the plow. Unforested land was mostly moor, heath, rocky upland or swamp—all unfit for farming, though the swamplands might be reclaimed by draining.

They found essentially similar conditions in the eastern part of this country, where the first settlements were established. When a pioneer went out to win a farm from the wilderness, the first thing he had to do was "make a clearing". The trees were cut down, and except for the logs he needed for his cabin and rail fences, they were burned to get rid of them. Potash, leached out of the ashes, was used mainly in soap-making, though some of it might be traded for such "store goods" as gunpowder, calico, salt and ironware. Then the stumps were pulled or blown out, and finally the land could be plowed and planted.

Not until the generation after the Revolution, when the first great wave of migration broke into the West, did settlers encounter extensive natural grasslands. There were "prairie islands" in the forest cover of Ohio, and when the settlers got to northern Illinois they found a continuous sea of tall grass, with timber belts confined mostly to the banks of rivers.

At first they didn't know what to

make of it. A doctrine arose, and was widely accepted, that only soil that could grow such big things as trees was "strong" and could produce good crops: soil that grew only grass was "weak" and not fit for farming. So for some years the farmers stuck stubbornly to the river banks and did not attempt to break the prairie sod, which was really much richer than the cut-over land they were cultivating.

There were two other, and better, reasons for the failure at first to put the grasslands under the plow. Early transportation followed the rivers a good deal, going either by boat or along roads that stuck to the easy water-level grades.

The other reason was the unsuitability of the early part-wooden or cast-iron plows for the tough task of ripping through the matted, cordlike roots of the prairie grasses. But about a hundred years ago steel plows began to be built—big ones, too, drawn by six or eight span of oxen. They made possible the conquest of the long-grass prairies, which are now the world's most productive corn lands.

*Science News Letter, April 19, 1947*

## • Books of the Week •

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APPLIED CHEMISTRY—Sherman R. Wilson and Mary R. Mullins—*Holt*, rev. 714 p., illus., \$2.36. With a unit on photography and discussions of new drugs, vitamin advances, alloys, synthetic rubber and textiles, this high school text emphasizes the importance of chemistry in living.

ATOMIC ENERGY COMMISSION: Official Records; Special Supplement: Report to the Security Council, *Columbia Univ. Press*, 141 p., paper, \$1. The five parts of this report, in French and English, cover proceedings, findings, recommendations, first report on scientific and technical aspects of the problem of control and on safeguards to ensure the use of atomic energy only for peaceful purposes.

CHEMICAL BURNS OF THE HUMAN CORNEA—Ralph McLaughlin; CHEMICAL BURNS OF THE RABBIT CORNEA—C. P. Carpenter and H. F. Smyth, Jr.—*Mellon Inst.*, 10 p., paper, free. These are reprinted from the "American Journal of Ophthalmology".

CONTRIBUTIONS FROM THE UNITED STATES NATIONAL HERBARIUM, Vol. 30, Part 1, *Gott's Printing Office*, 404 p., paper, \$1. This volume contains "A Botanical Bibliography of the Islands of the Pacific" by Elmer D. Merrill and "A Subject Index to Elmer D. Merrill's 'A Botanical Bibliography of the Islands of the Pacific'" by E. H. Walker.

DOORWAYS TO SCIENCE—George W. Hunter and Walter G. Whitman—*Am. Book*, 546 p., illus., \$2.40. A text for a general science course in junior high school, it

attempts to relate study to the world of science surrounding the individual. By including vacation hobbies and vocations, it develops useful leisure time pursuits.

FINAL JUDGMENT—Victor H. Bernstein—*Boni & Gaer*, 289 p., \$3.50. The degeneration of science is told here. Using documents only recently available from German sources, this story of Nuremberg reveals the full horror of the sadistic and brutal "experiments" of Nazi so-called scientists.

FUNDAMENTALS OF EARTH SCIENCE—Henry Dewey Thompson—*Appleton-Century*, 461 p., illus., \$3.75. Collected into one course, physiography, mineralogy, geology, geography and meteorology are treated as earth sciences and this college text serves to stimulate further studies and to satisfy the general student. Generous use of aerial photographs is especially noteworthy.

GOING FORWARD WITH SCIENCE; OUR WORLD OF TOMORROW, BOOK VII—G. S. Craig and John Urban—*Ginn*, 412 p., illus., \$1.56. For grade schools, this well-written text discusses The Pond in the Classroom, The Earth's Mineral Treasures, A World of Light and Color and other interesting topics.

HEATING, VENTILATING, AIR-CONDITIONING GUIDE, 1947—*Am. Soc. of Heating and Ventilating Engineers*, 25th ed., 1282 p., illus., \$6. Technical data section includes reference material on design and specification of equipment and results of laboratory research; a manufacturers' cata-



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logue data section is also present.

**JANE'S FIGHTING SHIPS 1944-45** (Corrected to April, 1946)—Francis E. McMurtrie—*Macmillan*, 636 p., illus., \$19. Presenting a picture of Allied naval strength at its peak, this edition includes vessels which have already been removed from the effective list. As full listing as possible is found in the War Loss section. Because of slow release of information for security reasons, and others, details sometimes conflict.

**POSTGLACIAL FOREST SUCCESSION, CLIMATE, AND CHRONOLOGY IN THE PACIFIC NORTHWEST**—Henry P. Hansen—*American Philosophical Society*, Transactions, Vol. 37, pt. 1, 130 p., illus., paper, \$2.25. The results and interpretations of pollen found in 70 sedimentary columns from widely scattered areas give a picture of the major vegetational trends and climatic cycles of the region.

**PRACTICAL EMULSIONS**—H. Bennett—*Chemical Pub.*, 568 p., 2nd ed. rev., \$8.50. A practical book on emulsions for industrial use with a comprehensive list of emulsifying agents and the most recently developed formulae.

**SCIENCE: A STORY OF DISCOVERY AND PROGRESS**—Ira C. Davis and Richard W. Sharpe—*Holt*, new ed., 538 p., illus., \$2.36. By beginning each unit with the historical background of the subject discussed, this junior high school text in general science helps pupils appreciate the scientific contributions to civilization.

**THE STORY OF WATER SUPPLY**—F. W. Robins—*Oxford Univ. Press*, 207 p., illus., \$5.50. Of vital necessity for the establishment of communities and their survival, water has dictated their location and touched off wars whose outcome depended entirely on control of a dependable water source.

**TOWARD BETTER PHOTOGRAPHY**—Vincent McGarrett—*Am. Photographic Pub.*, 260 p., illus., \$3. With chapters on color films, movies, and trouble shooting as well as selecting a camera and dark room technique, the careful reader becomes a better operator.

**TRAINING HIGH SCHOOL YOUTH FOR EMPLOYMENT**—C. E. Rakestraw—*Am. Tech. Soc.*, 217 p., illus., \$3.50. A plan is offered herein whereby vocational training on a cooperative part-time basis can be offered in high schools. Cooperative diversified occupations programs have been tried and found to fill the gap between school and employment.

*Science News Letter*, April 19, 1947



## WYOMING

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❁ **WHEELED suitcase**, recently patented, can be rolled instead of carried. Two small wheels, attached on one end near the bottom when the case is standing in ordinary position, touch the floor when the suitcase is tilted by means of an extension handle on the top near the other end.

Science News Letter, April 19, 1947

❁ **FOOD PROCESSING unit**, for the home kitchen, is built to fit into a floor cabinet and be completely covered when not in use. When open, its electric motor mounting permits the tool-holding shaft to be positioned where needed to operate stirrers and other kitchen tools.

Science News Letter, April 19, 1947

❁ **BOAT PROPELLER**, in combination with a steering unit, is at the end of a shaft beyond an attached vertical fin that acts as a rudder. The propeller shaft on this device, just patented, is united at the rear of the boat with the motor shaft by a universal joint, permitting horizontal and vertical movement.

Science News Letter, April 19, 1947

❁ **RUBBER FACING**, on the edge of an airplane's propeller blade to prevent the formation of ice, consists of a sheet-



ing of electricity-conducting rubber between two sheets of non-conducting rubber. Passage of electricity through the center sheet causes heat. Ice guard section of the blade is being held in the picture.

Science News Letter, April 19, 1947

❁ **TWO-BLADED peeler** for vegetables is clamped to the kitchen table

and operated with a hand crank. The fruit or vegetable to be peeled is placed on a central spearhead, and rotated in contact with two blades. The holding frame is set at an angle to allow peelings to fall to the table.

Science News Letter, April 19, 1947

❁ **DEVELOPING package** for photographers contains all the essentials for development and printing, including darkroom lamp, thermometer, measuring graduate, three trays, and packages of the chemicals needed. It also includes instructions on developing and printing.

Science News Letter, April 19, 1947

❁ **STEEL SHEETING**, only .006 inch thick and coated with a tin alloy, is claimed to be an excellent thermal insulator in construction. It reflects most of the radiant heat, keeping a house cool in summer and saving fuel in winter. It lasts for the lifetime of a building.

Science News Letter, April 19, 1947

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